

# Inhibition of Angiotensin-Converting Enzyme Reduces Cerebral Infarction Size in Experimental-Induced Focal Cerebral Ischemia in the Rat

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## Abstract

**Background:** The role of Renin Angiotensin System (RAS) in ischemic/reperfusion (I/R) injuries is not fully elucidated. Furthermore, it is not clear whether inhibition of RAS by Angiotensin-Converting Enzyme (ACE) inhibitors has beneficial effects in terms of protecting the brain from I/R injuries. In this study enalapril is used as an ACE inhibitor to evaluate the role of RAS in I/R injuries in the rat.

**Methods:** ACE inhibition was performed one hour before induction of ischemia using a single IP injection of 0.03 mg/kg or 0.1 mg/kg enalapril in the rats. Transient focal cerebral ischemia was induced by 60 min occlusion of the middle cerebral artery followed by reperfusion. Neurological deficit score (NDS) test was performed 24 hours after the start of reperfusion. Finally the animals were sacrificed under deep anesthesia, the brain removed and prepared for the evaluation of cortical and striatal infarction volumes using Triphenyltetrazolium chloride staining method.

**Results:** Pre-ischemic inhibition of ACE with non-hypotensive dose of enalapril (0.03mg/kg) significantly reduced cortical and striatal infarction volumes of ischemic rats by 41.6% and 52.7% respectively with concomitant improvements in NDS. However, no improvement was observed when ACE inhibition accompanied with arterial hypotension.

**Conclusion:** In the rat model of transient focal cerebral ischemia, ACE inhibition seems to reduce the severity of I/R injuries. Therefore, it is plausible to conclude that renin-angiotensin-system may participate in ischemic/reperfusion injuries.

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**Keywords** • Cerebral ischemia • angiotensin-converting enzyme • enalapril • angiotensin II • rat

## Introduction

**V**arious therapeutic strategies have been developed to attenuate the stroke-induced neuronal injury and the subsequent neurologic deficits and disability.<sup>1</sup> Recent experimental and clinical studies have suggested that inhibition of the renin-angiotensin system (RAS) by Angiotensin Converting Enzyme (ACE) inhibitors or Angiotensin II type 1 (AT1) receptor antagonists may be effective in reducing the incidence of

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